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Redefining Education in the Digital Economy: The Role of Social Innovation-based Learning in Information Systems Education

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Redefining Education in the Digital Economy: The Role of Social Innovation-based Learning in Information Systems Education

Completed Research

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Abstract

Social responsibility is at the core of modern Information Systems (IS) education due to increased attention by society on the ethics, human factors, and social consequences of emerging technologies. With the acknowledgement that most IS education falls short along these areas, this paper sheds light on the application of Social Learning and Social Innovation-based Learning in socially responsible IS Education. The connectivism principles were used to develop a learning model based on social innovation that was then tested by the example of an upper-division course (Systems Analysis) at a state university. The case study results suggested that the proposed learning model can help students to not only see information systems as social systems but also consider themselves as catalysts for positive change enabled by these systems. The findings also confirmed the positive impact of the proposed intervention on students' social skills. This study contributes to the future of IS education by proposing social innovation-based learning as a practical education paradigm for the digital economy.

Keywords: Information Systems education, Connectivism, Social learning, Social innovation, Social responsibility, Innovation-based learning, Social technology, Social skills, Soft skills.

Introduction

The world continues to become more interconnected as the inexorable development of digital network technology moves forward. Education is key to ensuring that members of society understand the new challenges that are introduced by an increasingly digital economy and how best to address them. However, the complexity of interrelationships between learning and teaching or innovation and innovativeness within such a rapidly changing field, as well as the requirement for sustainable social and economic improvement, demand the development of multidimensional interdisciplinary solutions beyond traditional educational models (Daniela 2018; Saavedra and Darleen Opfer 2012). The emergence of new digital technologies has also provided access to vast amounts of information and opened new forms of value co-creation. These changes have a profound impact on Information Systems (IS) education (Freeman and Taylor 2019; George and Marett 2019; Hsu and Backhouse 2002). Therefore, it seems appropriate to revisit IS education priorities and develop new learning models to meet the challenges of a rapidly changing digital world. Among these needs, IS educators suggest paying particular attention to ethics, human factors, and social consequences of emerging digital technologies (du Plooy 2011). Socially responsible IS education can prepare the next generation of IS professionals to more clearly understand the relationship between the

latest technologies, use of information, and ethical standards as well as to take moral action in light of the technology's organizational, social, and environmental consequences.

The focus of this paper is to propose an alternative IS teaching model based on the "Connectivism" learning paradigm, specifically the application of social learning and innovation-based learning to IS education. We first discuss Connectivism and their impacts on helping students improve non-cognitive skills such as social skills. We then propose a social innovation-based learning model that emphasizes preparing students for today's workforce through enhancing their social skills and introducing to them the challenge of solving real-world problems. To evaluate the effectiveness of our proposed model, we studied an upper-division Management Information Systems course–*Systems Analysis*–at a state university for two years. In total 276 participating students completed 58 semester-long social innovation projects. The results suggest that social innovation-based learning is a promising model for modern IS education. Our model establishes a foundation for further research and suggests strategies for its adoption by other institutions.

Connectivism

New theories of learning that are adapted with technological advances have emerged in recent years. These advancements facilitate networked learning, co-operation between learners, and open sharing of ideas (Sahlberg 2006). However, new learning media and technologies are utilized by educators with minimal modification of underpinning educational models including instructional methods, standardized curricula, and assessment systems. One of the most promising learning paradigms that could potentially address this challenge is Connectivism (Downes 2020). Connectivism is a learning paradigm developed for the digital age that provides a framework for network learning and that embraces technology, collaboration, and socialization (Downes 2006; Faiella 2013; Hartgerink et al. 2001). Connectivism has been used as a theoretical lens to implement social learning in different educational settings including postsecondary STEM education (Hogg and Lomicky 2012; Marais 2011; Smidt et al. 2017).

Knowledge in today's information age is not controlled by a single organization, nor is it accumulated in one place (Kop and Hill 2008). Connectivism acknowledges the chaotic and constant flow of knowledge in mediated and unmediated knowledge networks. As technological advancement continues to influence the creation and sharing of information as well as how people interact and socialize, Connectivism holds great promise for modern IS education (Siemens and Conole 2011). For example, Connectivism promulgates continuous lifelong learning through interconnected activities (Bessenyei 2008). Connectivist learning requires students to search for, filter, analyze, and synthesize information and assess the value of knowledge in different but connected contexts (Darrow 2009). Connectivism facilitates the learners' knowledge discovery and formation through social activities enabled by networking, interactivity, and social experimentation (Abhari 2017). Connectivist teaching encourages students looking for connections in the learning materials and their applications instead of memorizing the material (Crosslin 2016). Connectivism encourages students to focus on know-why and allows them to become self-directed learners (Rice 2018). Connectivism also defines learning processes as a set of social activities that enhance students' soft skills, social responsibility, and self-directed learning (Smidt et al. 2017). While traditional teaching models do not necessarily render the social responsibility (Ramsey 1993), Connectivism, by relying on social interaction, encourages students to explore and find solutions for their community issues (Marais 2011). Connectivism makes use of social technologies, which enriches the learning experience for students. These tools are active, process-based, anchored in and driven by learners' interests (Mcloughlin and Lee 2010).

We propose Connectivism as a theoretical framework for understanding social learning. Connectivist learning starts with the learner participating in the exchange of information with a goal-oriented learning community (Cerny 2015). This learning process involves the exchange of facts and concepts, experimenting with ideas, joint reflection on them, and the collective restructuring and fine-tuning of the ideas (Andres 2011). This process is also characterized as a composite theory of learning that draws from a diverse set of educational theories, learning, and philosophy of knowledge situated and related to the transformative possibilities offered by emerging technologies (Bell 2011). It is of particular interest for IS education as Connectivism acknowledges that knowledge can reside in non-human objects and in networks of digital tools (Bessenyei 2008). Thus, learning outcomes can be defined as the ability to see connections between fields, ideas, and concepts and expand these connections (Abhari 2017). As supported by social cognitive theory (Bandura 2001; Krcmar 2019), learning is the process of how learners incorporate knowledge into their own sets of ideas and connect it to real world applications. Increasing flows of information also require

minds that can learn, unlearn, relearn, and find patterns in different social contexts. Therefore, the interaction between students and their community could both teach and reinforce learning (Faiella 2013).

Supported by Social Cognitive Theory (SCT), Connectivist learning is a social phenomenon with a dynamic and reciprocal interaction of the learner, environment, and behavior (Bower 2019). Due to this reciprocity, a learner can dynamically adjust their behavior and goals based on the social context of the learning community while interacting with others across knowledge networks (Choi et al. 2014). This process helps learners with self-regulation and noncognitive skill development, especially when learners are granted autonomy (Lin and Chang 2018). Other social effects such as social recognition and praise as suggested by SCT are also the outcomes of connectivist learning (Darrow 2009; Lin and Chang 2018). For example, learners feel more confident and self-satisfied with their own growth when they can help other members of the learning community (Al-Fraihat et al. 2020). Moreover, unlike traditional educational settings, learners in Connectivist learning environments are more likely to perform a specific behavior if that behavior is supported by the learning community. This helps lay the foundation for encouraging that learners develop responsibility toward other learners, other members of the community, and the learning environment.

Social Responsibility and Connectivism

As societies become more interconnected and complex (Sahin 2012), the traditional education system needs to undergo fundamental changes to nourish socially responsible students (Branchet and Sanseau 2017; Dima et al. 2012; Grau et al. 2017). The education system which does not acknowledge the importance of know-why, beyond know-how, utterly fails to prepare students to think creatively and solve social issues. Social responsibility can be defined as an investment one makes to improve the well-being of others and of the planet (Berman 2009). There is a growing consensus about the role of education systems in preparing socially responsible citizens (Macready 2009). Numerous institutions have already made socially responsible teaching a priority in their undergraduate curricula (Atakan and Eker 2007; Hurtado et al. 2012). These institutions acknowledge that education cannot be limited to classrooms and laboratories and isolated from communities (Ramsey 1993); rather, education can be viewed within the larger context as part of modern society (Stolterman 1995). University students can be engaged in local communities and focus on contributing solutions to challenges within their community environments (Grau et al. 2017).

IS education is no exception (Chiţiba 2012; Zhang 2007). To keep up with the fast-changing field of IS, educational institutions are required to reinvent themselves by updating new teaching methods and flexible learning models (Freeman and Taylor 2019; George and Marett 2019; Hadidi and Power 2019; Uğur and Hamit Turan 2019). However, IS programs have struggled in the past to find a balance between conceptual rigor and real-world practice (Dhar and Sundararajan 2007). Students are narrowly educated on how to analyze, design, and manage information systems rather than prepared to solve real world challenges using these systems (Harris and Lang 2011) IS programs can satisfy this requirement by providing a wide range of opportunities for learners to exercise meaningful problem solving in their own communities. This is likely the most effective way to help learners feel empowered to act on social issues (Berman 2009). The Connectivist approach to IS education requires learners discover and elaborate on the connections between IS theories and their applications within their communities (Siemens et al. 2005). It challenges students to connect to the community, examine the relevance and validity of content, and gain first-hand knowledge through working on social problems. This high level of engagement in solving community issues forces learners to develop social skills as well as confidence in taking responsible action (Berman 2009).

Social Skills and Connectivism

There is a widely held view, reinforced by executives and hiring committees, that suggest learners develop soft skills such as effective communication, team building, and leadership to enhance their career prospects (Ahmed et al. 2013; Mitchell et al. 2010; Turner and Lowry 2001). Recent technological changes, such as the widespread implementation of project management software platforms, have significantly impacted employers' expectations of graduates with regards to their ability to work responsibly and demonstrate effective social skills (Mitchell et al. 2010; Robles 2012). There is also an increasing demand for graduates who can communicate the mission and purpose of the company they work for with the public (Salleh et al. 2010). Soft skills are particularly important for IS learners (Snell et al. 2002), as they are the bridge between technical and non-technical teams at many organizations. Moreover, the shift to a digital and service-driven economy has increased the importance of soft skills among IS professionals (Lavy 2013). Likewise,

institutions shift their focus towards the training of character qualities, instead of just foundational literacy (Alvarez 2018). On the contrary, studies again and again reveal that IS graduates lack effective soft skills (Branchet and Sanseau 2017; Darrow 2009; Noll and Wilkins 2002; Uğur and Hamit Turan 2019). The current education models fail to strike the right balance between theoretical and project-based education in ways that improve social skills (Beard et al. 2007; Branchet and Sanseau 2017). There is a disparity between soft skills needed, and skills taught in IS programs (Ellis et al. 2014; Uğur and Hamit Turan 2019).

A Connectivist learning environment creates an opportunity for students to develop their social skills (Reese 2015). For example, it promotes incorporating learning opportunities, such as service learning, that extends beyond the boundaries of the classroom (Darling-Hammond et al. 2019). Connectivist learning environments provide an opportunity for learners to interact with their peers and community; and, thus, develop social skills organically (Dunaway 2011; Kropf 2013). Learners also experience a diversity of opinions while they are working on issues that influence people in different ways and thus develop social awareness. They also learn about social norms by having their behavior monitored and observing the reactions they receive from their peers (Macready 2009). This contributes to the development of emotional intelligence. Students develop self-confidence through the independence that they are afforded through open ended learning assignments. The experiential and autonomous learning environments offered by Connectivism help learners enhance their leadership skills in social contexts. Connectivism also forces students to fully understand the context of every problem and gain more of a sense of ownership in solving those problems, which ultimately results in improving their leadership skills.

Social Innovation-based Learning in Connectivist Environment

Connectivist learning models emphasize learning-by-doing, integration with the learning communities, looking for open resources and engaging with the context of learning. The contextualized approach of this research is aimed towards the adaptation of (Downes 2020) interpretation of connectivism. While the significant of these practices have been proven (Downes 2020), the learners' autonomy and openness of learning environments in IS education create some challenges for the learners with a low level of self-regulation and drive. Unregulated and unguided connections between learners would also increase the risk of confusion and thus, lower the efficiency of social learning that promotes by connectivism. Hence, connectivist teaching could be more targeted and systematic when learners focus on explicit problems in specific context. This brings together learners from diverse backgrounds to work together on real problems that face their communities. Another limitation of IS curricula is neglecting the importance of creativity and creative learning. Engaging learners in creative learning activities with emphasis on and innovation have historically been absent from the curricula (Gasparin et al. 2020). When learners focus on developing a new product or solving a problem using information technologies, they go beyond IS theories and abstract applications, construct and socialize in an extended innovation network, and work collectively towards the success of their projects. This behavior ultimately could lead to preparing the next generation of digital entrepreneurs who are committed to societal improvement (Gasparin et al. 2020).

This new approach to Connectivism entertains students' autonomy, resource openness, opinion diversity and network connectivity–principles of Connectivism (Abhari 2017). This clearly defines learning goals as well as the boundary of learning network. To experiment with this idea, we used social innovation as the main learning goal and learners' community as the boundary of learning network. While Connectivism is a learning vehicle, social innovation can provide meaningful educational substance to almost all IS subjects. Through social innovation learners can express their creativity (exercise their autonomy), extend learning to beyond textbook knowledge (openness), connect to their community (connectedness), and examine problems and their potential solutions from different perspectives (diversity). Therefore, learners can task with social innovation. Social innovation in this context refers to "a novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals" (Phills et al. 2008, p. 36).

Successful adoption of social innovation in IS education consists of identifying a social problem and determining a novel approach to filling the gaps in service provision (Chow et al. 2019). Social innovation is more meaningful to learners than rote problem solving out of a text because students can experience its social and public values firsthand. It results in both social motivation and social awareness since the willingness to change derives from the awareness about a challenge and its possible solution (Bacon et al. 2008). Social innovation also allows learners to realize their creative capacities to promote such change and

shifts their perspective about social change leadership. Real world problem solving requires learners to connect, evaluate, and utilize external resources including people, skills, and networks (Lessa et al. 2016).

Teaching through social innovation allows IS educators to demonstrate the socio-technical aspects of IS (Jørgensen et al. 2009). Learners experience these aspects of IS outside of formal classrooms through exchange with end users and community stakeholders (Baker and Mehmood 2015). This supports learners develop personal networks or connect to existing socio-professional networks, foster collaboration, and bridge institutions. Collaboration through networks creates awareness of and empathy for the needs and opportunities of all actors (Castro-Arce and Vanclay 2019). Learners also feel confident in their ability to perform in class due to the higher level of engagement, motivation, and self-efficacy (Lin and Chang 2018).

Implementation Strategies

The proposed four interconnected learning strategies–*social exploration, social ideation, social experimentation,* and *social validation*–inspired by (Abhari 2017; Smidt et al. 2017) to implement a social innovation-based learning in IS programs (Figure 1). These strategies are in line with the four stages of informal learning proposed by Downes (2010): aggregating, remixing, repurposing, and feed forward.

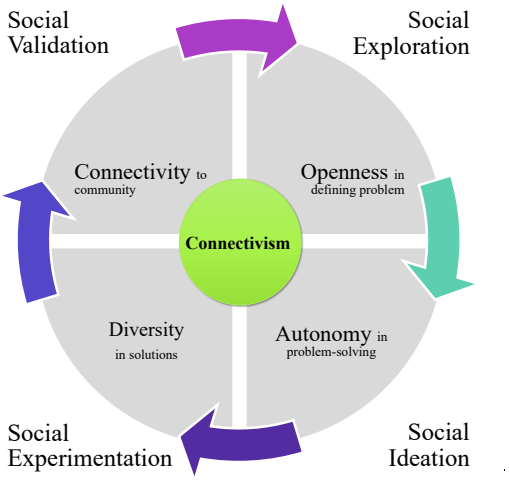

Figure 1. Proposed Connectivist Social Learning Model

Social exploration extends the learning process beyond the classroom and into students' communities by asking them to identify a social problem. Social exploration requires IS educators to encourage students' active participation in dynamic interest-based social exchanges beyond the classroom boundaries. Social exploration allows students to find and process knowledge in their own preferred ways and define the value of knowledge within their own social contexts. As students use social exploration to identify a potential issue, the instructor can help them make connections between content and application. Social exploration is the first step of Connectivist learning where students explore problems, research information, and accumulate knowledge to inform the next stage of social ideation. Social ideation enables students to connect different disciplines and subjects across campuses and engage propose potential solutions to existing and emergent social problems. During social ideation, students brainstorm a variety of strategies to come up with a set of possible solutions using the knowledge they acquired during social exploration. The goal of social ideation is to develop possible solutions to a particular authentic learning problem. Students may compete in proposing better solutions while at the same time collaborating to critically analyze their own or others' ideas. It is imperative that IS students gain critical acknowledgement of network learning, technological, environmental and global issues as a fundamental learning outcome of their college education (Harris and Lang 2011). During social ideation, the instructor supports collaborative learning and teaches the students strategies for developing a set of solutions. Next, social experimentation allows students to make predictions and elaborate different aspects of the solutions by testing and evaluating hypotheses in a social setting. The purpose of this phase is to apply the knowledge gained during social exploration and the critical analysis and feedback from social ideation to evaluate solutions and arrive upon a plan. The instructor support helps students determine the validity of their solutions through formative assessment and collaborative discussions. The important phase that follows social

experimentation is social validation, where students publicly present their experimental results and solicit feedback from community members and experts in the field. Opening oneself up to critical feedback is an absolute necessity for scientific progress. It can help students identify where they have succeeded in identify novel solutions and suggest pitfalls that require further attention. Thus, the process can begin again.

Case Study

We conducted a case study to evaluate the outcomes of implementing this model (Yin 2009) in an upper-division Management Information Systems course--*Systems Analysis*--at a state university over three semesters. The course was chosen due to the reported gap between curriculum and employers' needs. The objective of the course is to prepare IS students with practical knowledge of the systems development life cycle (SDLC). Data were collected on 276 students (58 teams) from five sections by using a pre- and post-course survey. Surveys allowed students to report on their experience with the five dimensions of social skills and social responsibility. The survey was designed to measure improvements in various aspects of soft skills such as communication and teamwork (Robles 2012) and social responsibility (Grau et al. 2017).

In traditional form, IS students learn SDLC concepts and techniques from lectures and textbooks and, in some cases, conduct systems analysis for a predefined generic project assigned by the instructor. Numerous limitations are evident with that approach. To address these challenges, the four integrated learning strategies proposed by this study were planned by instructor and implemented by students: students were encouraged to work in teams to identify a social challenge, collaboratively ideate new solutions, professionally design the experiment, and then to present their results during a public poster event. The final deliverable was a system proposal with detailed requirement analysis, process mapping, feasibility study, use cases, logical design diagrams, physical design architecture, user-interface prototype, cost estimates, and implementation plan. The instructor and community partners facilitate this process and evaluate students' work in six phases based on their completeness, feasibility, innovativeness, effectiveness, and professional presentation. Though it was not required that the students fully implement their systems, they made detailed prototypes by providing all necessary analysis and documentation design to support development efforts in the future. The projects ranged addressed social issues related to homelessness, healthcare, education, community-building, environment, food supply chain and school safety among others. For example, students proposed AI-enabled solutions to locating disaster victims when they are not able to be tracked due to the loss of cellular and satellite communication.

Students were instructed to consciously embrace the four phases of social learning by focusing on each one for roughly four weeks. Student teams were organized into groups of five by the instructor and each given different roles based on their area of interest: *Project Analyst, Business Analyst, Backend Analyst, Frontend Analyst*, and *Implementation Analyst*. Students used an agile methodology (Crystal Clear) and Asana platform to manage their projects. Each class started with sprint planning, continued with interactive lecture, and concluded with a project-related activity. Instructor provide personalized support as necessary. Social exploration phase lasted for one month allowing students to identify and commit to a social need within their community and explicitly define the value of course content within their own social context. In the second month of class, social ideation enabled students to collaboratively form ideas using latest technology concepts such as IoT, AI, VR, and Cloud that are not covered in the textbook. Each team member competed in proposing a better solution that would enhance the system already at work, but at the same time, collaborated to critically analyze their own or others' ideas. This allowed students to critically examine innovative ideas from different perspectives. The students spent the third month of class on social experimentation, which required them to work within the community to examine the feasibility, utility, and desirability of their proposed system. The last phase of the project, month four, was social validation when students refined their work, documented their solution, and publicly presented the results of their work.

Student survey results revealed that the Intervention was successful in terms of supporting the college's SLOs as well as developing social skills and social responsibility. In comparison with the baseline value, the participating students showed a higher gain in all dimensions of social skills and social responsibility Since social innovation was the core of the semester project; as a result, students developed a higher level of motivation and confidence as a "change catalyst" in their community. The results showed considerable progress from pre-survey to post-survey in recognizing the need for change, acknowledging the need for change, modeling the change expected of others, advocating positive change, and being able to make positive changes (Table 1).

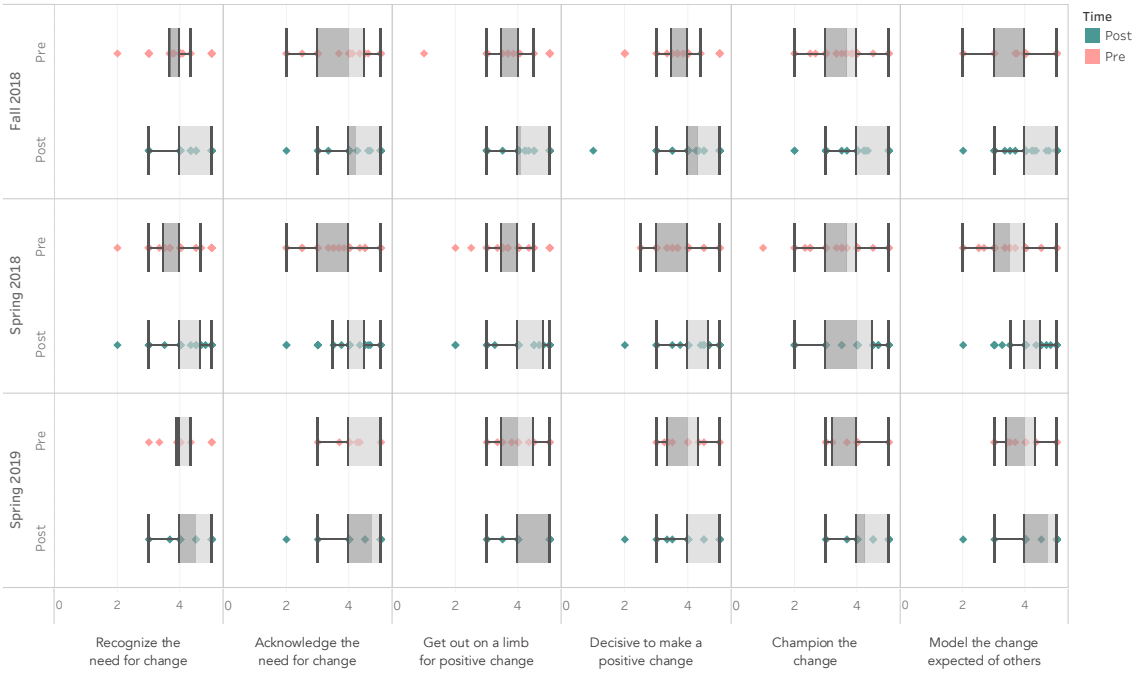

Figure 2. Social Responsibility | pre and post survey result

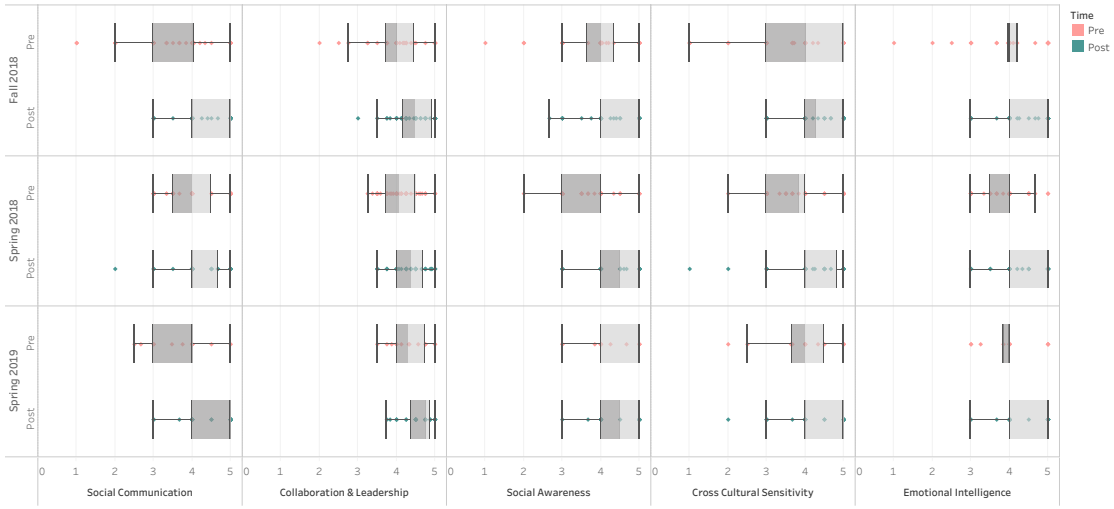

Figure 3. Social skills | pre and post survey result

Construct	PRE		POST		t-value*
	Mean	SD	Mean	SD	*p <0.001*
Recognize the need for change	3.92	0.94	4.29	0.74	3.04*
Acknowledge the need for change	3.96	0.98	4.35	0.90	2.85*
Get out on a limb for positive change	3.91	0.94	4.19	0.89	2.02*
Decisive to make a positive change	3.83	0.85	4.22	0.93	2.70*
Champion the change	3.63	0.82	4.04	0.85	2.76*
Model the change expected of others	3.80	0.81	4.16	0.73	2.77*
Social Awareness	3.91	0.89	4.32	0.68	4.85*
Collaboration & Leadership	4.17	0.60	4.44	0.54	4.57*
Social Communication	3.77	0.91	4.30	0.70	6.07*
Cross Cultural Sensitivity	3.74	0.98	4.23	0.81	5.14*
Emotional Intelligence	3.91	0.80	4.31	0.68	5.07*

Table 1. t-Test Results

Discussion and Conclusion

Our model for teaching advanced IS courses through social innovation within a Connectivism environment has many benefits over traditional IS education. Chief among these is the opportunity for students to see their work extend beyond the classroom and to develop students' social problem-solving skills. It required students to identify a business that caters to an underserved community or a social challenge, work with their teams and ideate for a new digital solution, professionally propose a new system design based on IS concepts, and publicly present their solutions to external judges. While the new model is not flawless, survey results indicate its potential as an alternative teaching method that can be used to enhance students' soft skills and social responsibility. We recognize that potentially other factors may have contributed to the effectiveness of this model. The results suggest the effectiveness of this model not only in improving typical learning outcomes but also in raising students' social responsibility and social skills–the missing component of typical IS programs. This model enabled by new social technologies. These technologies provide the opportunity for students to interact with their community beyond the classroom boundaries and define their own learning experience in a more authentic learning environment. This creates an improvement in social skills and be more effective in assuming social responsibility and fulfilling duties.

The application of social innovation in IS education offers new opportunities to enrich IS curricula with social responsibility, social learning and self-regulated social learning. These skills among the most sought across the industry due to the increasing attention to ethics, human factors, and social consequences of emerging technologies. Our systematic approach to social learning paves the way for preparing the future ethical leaders in the digital economy with three significant implications. Firstly, we offer a new instructional model to maximize engaged learning time in students. Part of the learning experience, the social innovation process promotes a practical team structure and incorporates real-world business roles for each student. Working in an agile team for the duration of the semester helps each student to experience how system analysts work and create values. Above that, students have the opportunity to learn about the importance and potential social impact of their work which in turn increases engagement and motivation. Future research can build on these findings to further evaluate the effectiveness of this intervention in other courses or settings and offer recommendation for future course design and delivery.

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